NCST Investigation of the Champlain Towers South Collapse

Cross-Project Panel Theme 3: Failure Hypotheses Development and Evaluation

David Goodwin, Kamel Saidi, Judith Mitrani-Reiser, Jack Moehle, and James Harris

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

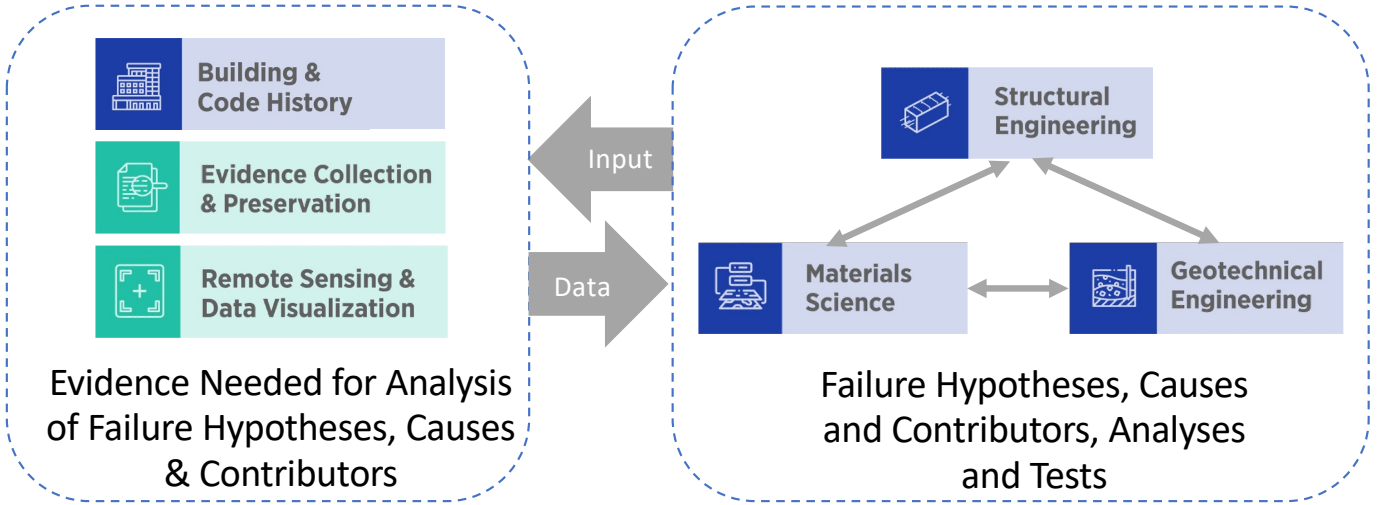
CTS Investigation: Workflow and Database for Failure Hypotheses

Hypotheses
Possible scenarios for initiation and progression of the collapse

Causes & contributors
Possible factors that played a role in the collapse

Analyses & tests
e.g., structural models such as ATENA, mechanical testing of concrete cores

Evidence needed
e.g., interview data, pictures of the collapse site, etc.



CT Evidence and Failure Hypotheses

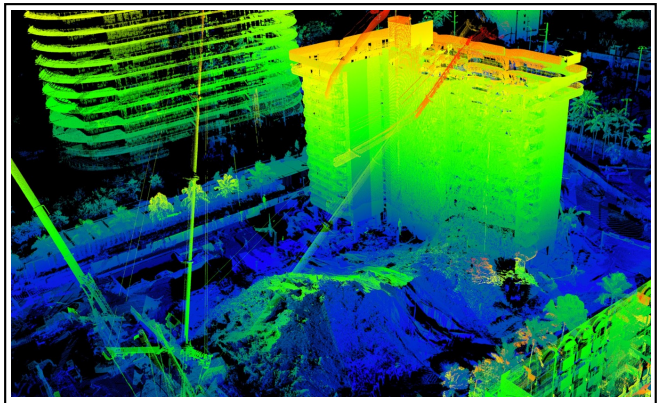
Home › Failure Hypothesis › Hypotheses

Analyses and tests + Add
Causes and contributors + Add
Evidence needed + Add
Hypotheses + Add

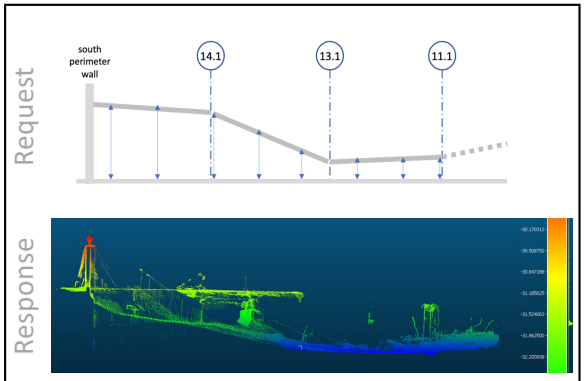
FAILURE HYPOTHESIS ID	HYPOTHESIS CATEGORY	HYPOTHESIS DESCRIPTION	GRID POINT COUNT	RATING	LEAD
PSC15	PSC - Pool Deck Slab-Column Connections	The connection between slab x and column y failed.	1	Possible	Glenn Bell

CTS Investigation: Remote Sensing and Data Visualization Supports Analyses of Failure Hypotheses

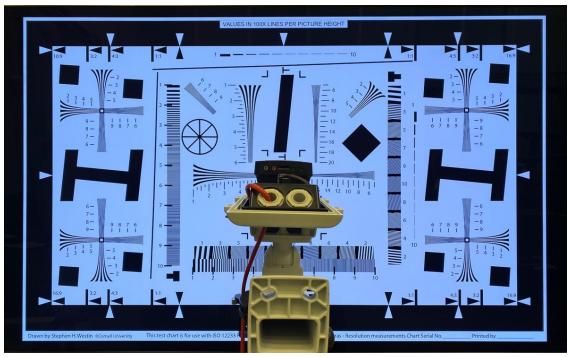
View of the underside of the pool deck. 1



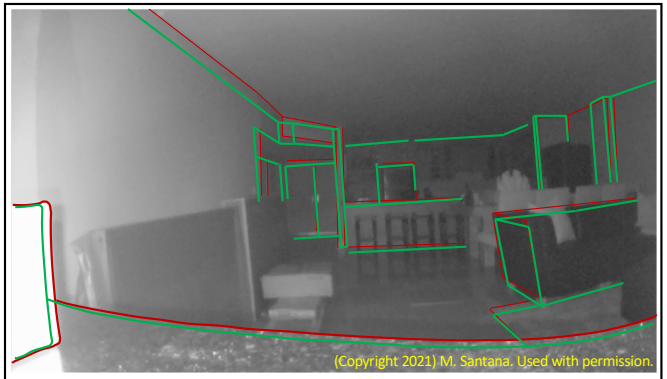
Multiple merged datasets captured by a 3D terrestrial laser scanner in one day. 2



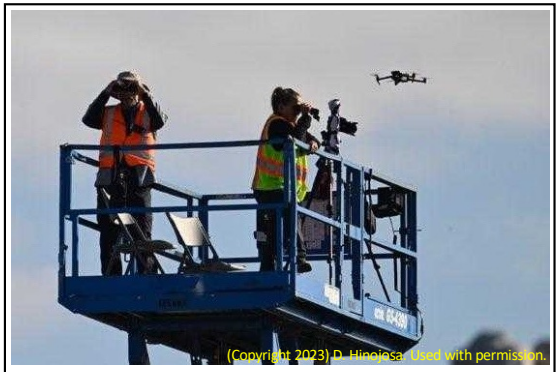
LiDAR data analysis results showing a sketch of the requested area (top) and a profile view of the area of interest (bottom). 3



Testing of a replica of the surveillance camera that captured collapse footage from 8701 Collins Ave. 4

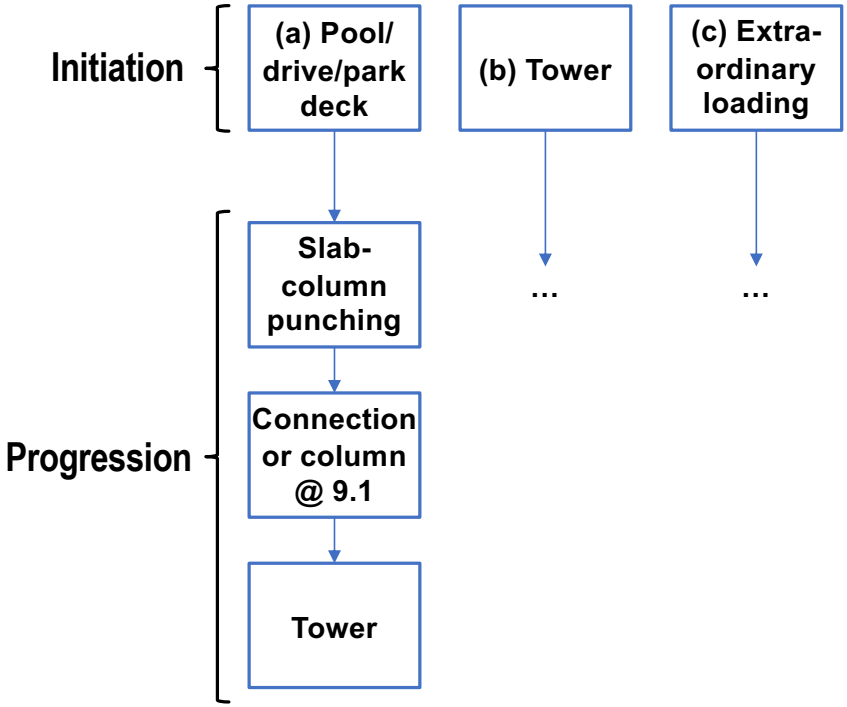


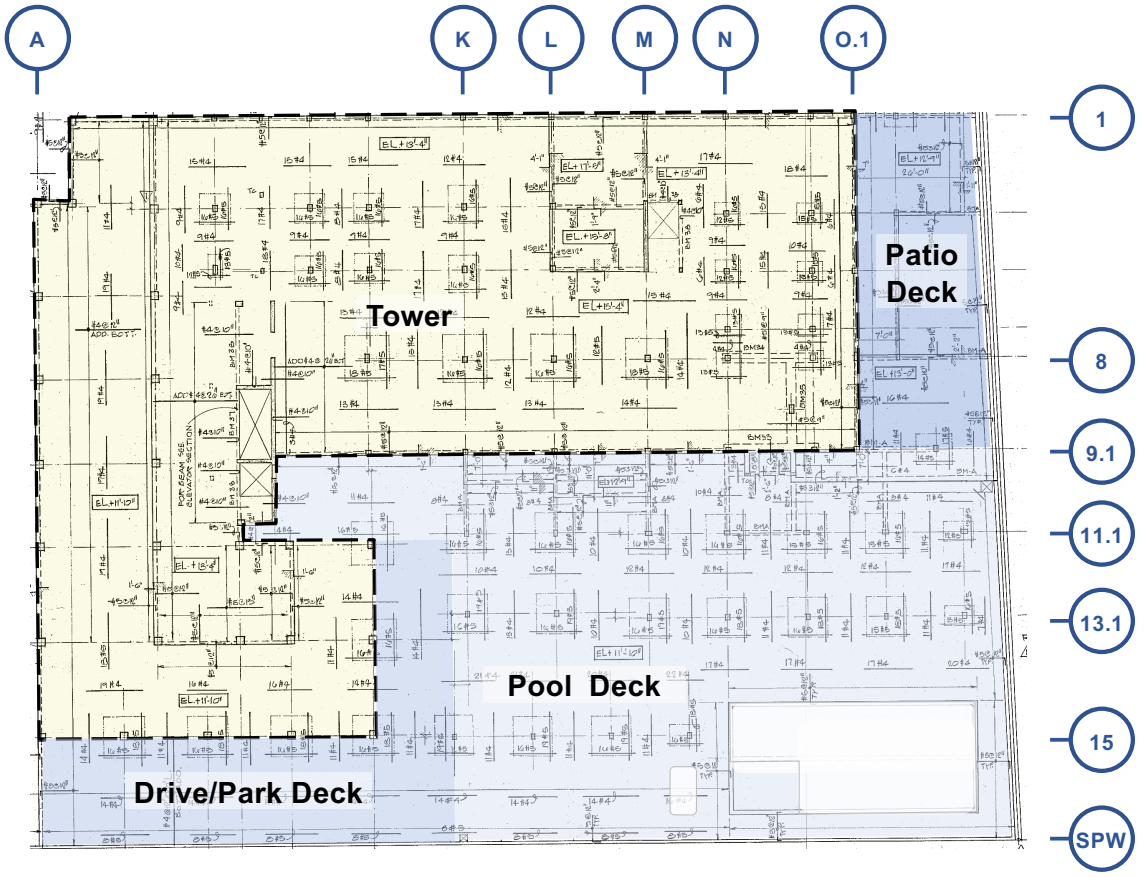
Pre-collapse (green) and during-collapse (red) surfaces from preliminary analysis of security camera footage. 5



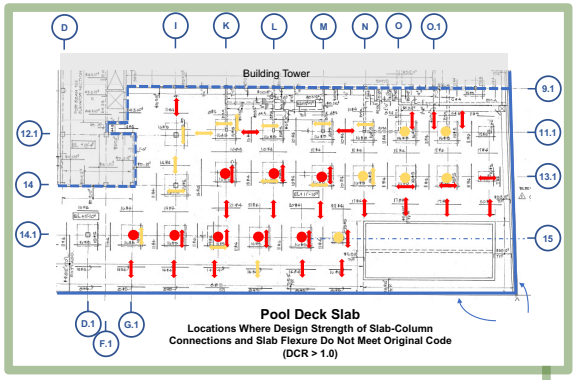
Search for the CTS DVR included aerial lifts, binoculars, zoom cameras, and drones. 6

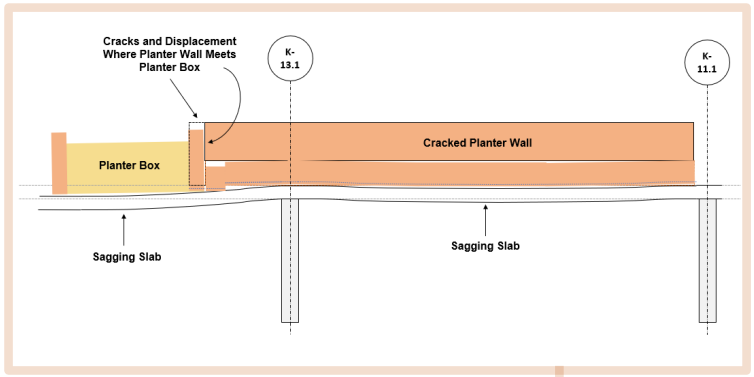
CTS Investigation: Failure Initiation and Progression Hypotheses





CTS Investigation: Collapse Timeline





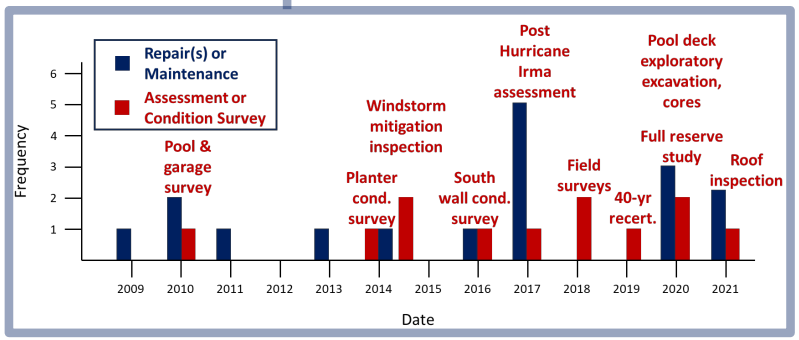
Site History — **1900-1979**

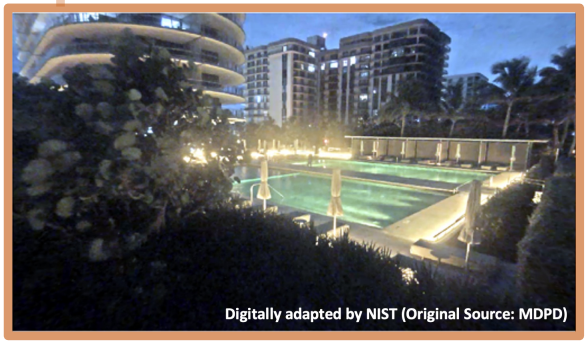
CTS Design & Construction — **1979-1981**

CTS Building History — **1981-2021**

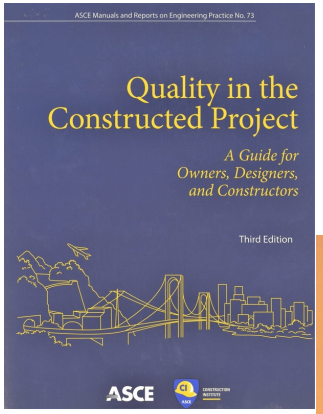
Champlain Towers South Collapse

- **Weeks/Days Prior to Collapse**
- **Hours/Minutes Prior to Collapse**
- **Initiation & Progression**

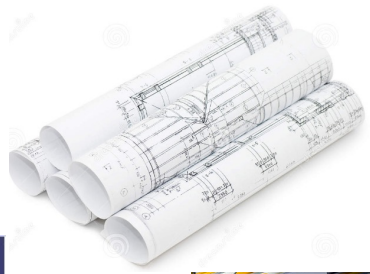


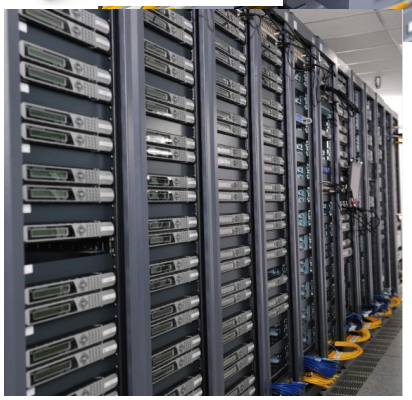


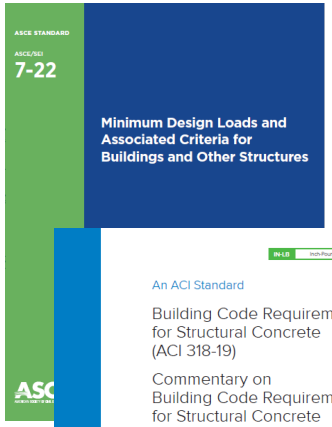
Potential Topics for Recommendations

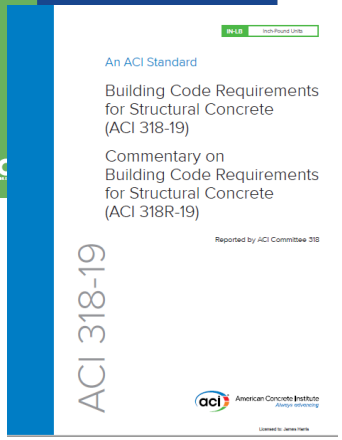


Manual for Bridge Evaluation (AASHTO)









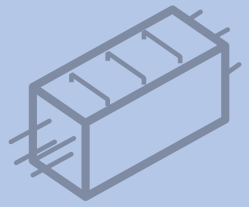
QC/QA Issues; Tools and Guidelines for Assessment of Existing Buildings; Retention of Documentation; Codes and Practices for New Construction

Questions?

Theme 1:
Evidence Collection, Measurements, and Visualization

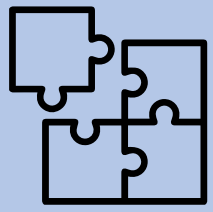
Sissy Nikolaou, Christopher Segura, Jonathan Weigand, Emel Ganapati, Georgette Hlepas

Theme 2:
Materials, Geotechnical, and Structural Analysis and Testing



Glenn Bell, Ken Hover, Scott Jones, Youssef Hashash, Fahim Sadek

Theme 3:
Failure Hypotheses Development and Evaluation



David Goodwin, Kamel Saidi, Judith Mitrani-Reiser, Jack Moehle, James Harris

NIST | NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE